

approves the program, the version is then either released or validated, depending upon the permission level, as will be described further below, and will receive an "R" or "V", respectively, at the end of the version, which is then frozen. The line will no longer require the manual intervention for the start button to be pressed for each board to go through the line thereafter. Thus, when the last released version is being edited, the version automatically increases by 1 and sets the last digits to .00. Similarly, when an earlier released version is being edited, the first digit of the version will be increased by 1 and the last two digits set to .00. When an unreleased version is being edited, the version number does not increase.

[0031] When a sub-object (released or unreleased) of an unreleased version is being edited, the version of the main object does not increase. On the other hand, when a sub-object of a released version is being edited, the version increases by 0.01 and will be marked as unreleased. When the same sub-object then is released, even as part of a different recipe, the main object will automatically be released for the areas the sub-object was released.

[0032] It will be appreciated by those skilled in the art that it is most important to have the latest valid and working program running in the manufacturing line. If a slight change is made to a working program, the user is, according to the present invention, automatically notified and informed of what modification to check and approve. Depending upon the level of the "permission" or approval authority that the user has, the user may be allowed

to validate the product for a line, or release the product for the factory or globally.

[0033] Validation and release processes are distinguished by the

- 5        level of permission granted to the user for validation and release. Released objects (such as recipes) are valid for an entire factory having multiple lines, or even a plurality of factories, whereas validated objects are valid for only one line. Release can only be given to objects by authorized users with high levels of permission. In contrast, validation can be done by personnel with
- 10      lower levels of permission, such as operators, to allow them to modify programs that cause a problem and then continue the running of the line. However, any change the operators make is valid only for that line, and it requires the approval of an expert (such as an authorized process engineer) for the change to be disseminated to the rest of the factory. Likewise, before
- 15      the validated objects can be downloaded to other lines, they must first be selected by someone with the appropriate permission level. Released versions are, in general, the version that will be downloaded. Just as the release of a higher level object will release lower level objects automatically, the validation of higher level objects will validate lower level objects
- 20      automatically.

[0034] According to another aspect of the present invention the

process of releasing a version provides for the most flexibility in not curtailing the productivity of the line. That is, any user can release objects

commensurate with his or her level of responsibility and accountability. In one embodiment, on every machine on which an unreleased version is run, after each product (e.g., circuit board is run under the unreleased version), a

release dialog appears, asking to release the data. For example, the question

- 5 may be "Would you like to release recipe Telephone\_386?" The pop-up dialog window has three buttons respectively labeled "Yes", "No" and "Details." Under Details, information can be displayed as to exactly what is to be released. Preferably, there is the additional feature under the Details button to be able to select and release parts of the recipe, rather than the
- 10 whole recipe for which a higher level of permission would be required. Thus, any personnel, commensurate with their level of responsibility, can release objects with or without user accountability.

[0035] Releasing objects with user accountability, however, requires

- 15 that information regarding what object is released by whom is to be recorded. This is especially important on lines where more than one operator works, in order to know who released a particular object. In this case, after pressing the "Yes" button on the Release Dialog, another pop up dialog is presented where the user name and password are to be entered. Only if the password
- 20 matches with the user name, and the specific user has the level of permission required, is the object, e.g., recipe, released and the user information stored with it.